CATALYTIC METHANE SENSOR

User Manual

User Manual Part Number: 165714

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Designed and manufactured in Australia by Ampcontrol Electronics Pty Ltd

WARNING!	**This safety alert symbol identifies important safety messages in this manual and indicates a potential risk of injury or even death to personnel. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.**

CAUTION!	**This safety alert symbol identifies important information to be read in order to ensure the correct sequence of work and to avoid damage or even destruction of the equipment, and reduce any potential risk of injury or death to personnel.**

	Supplementary information not directly affecting safety or damage to equipment. Carefully read the message that follows, and inform other relevant personnel.

	Information concerning possible impact on the environment and actions required for prevention and proper response.

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Before You Begin

We would like to thank you for purchasing the Ampcontrol Gasguard Products.

WARNING!	**To become completely familiar with this equipment and to ensure correct operation, we strongly recommend that you take the time to read and thoroughly understand this user manual.**

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1 SAFETY AND OTHER WARNINGS

For safety reasons, the Gasguard CH4 Sensor must be installed, operated and serviced only by competent personnel. Read and understand this instruction manual completely before installing, operating or servicing this equipment. Failure to install or operate this instrument in accordance with the instructions contained in this manual may create hazardous operating conditions.

WARNING!	**1. The sensors should not be stored in areas that contain solvent vapours. Some of these vapours are known to create false "high" zero points and may even damage the sensor electrodes. Similarly, the sensor should not be exposed to high levels of solvent vapours while in operation.** **2. This equipment has been designed to detect explosive gases and vapours and to give warning before they reach dangerous conditions.**

1.1 Safe Use of Equipment

The equipment supplied has been manufactured according to the state of the art, and designed to ensure a safe operation. The equipment may only be used within the design parameters.

The instructions within this manual must be observed as an aid towards achieving maximum safety during operation.

The owner/user is responsible for observing the following instructions:

1.1.1 Changes to Equipment

Changes in the design and modifications to the equipment are not permitted. Unauthorised changes made to the hardware or operating firmware will void the manufacturer's warranty, and may compromise the integrity of the system into which it is installed and other connected equipment.

1.1.2 Equipment Knowledge

Experience with, or understanding of, this equipment is essential for the safe installation and removal of the equipment. Therefore, in case of a question on how to safely proceed, contact Ampcontrol immediately.

1.1.3 Manual Handling

Precautions have been taken to ensure all equipment is safe to handle and free from sharp edges. However care should always be taken when handling enclosures and gloves should be worn.

1.1.4 Installation

Correct operation and safety depend on the Gasguard CH4 Sensor and associated equipment being installed correctly. Mechanical and or electrical installation and maintenance of plant and equipment must only be carried out by appropriately qualified personnel and must be tested thoroughly prior to operation.

1.1.5 Operation

As safety depends on the Gasguard CH4 Sensor functioning correctly it is highly recommended that all safety functions of the unit be periodically tested to ensure correct operation.

2 RECEIVING AND STORAGE

2.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment, however before accepting delivery, check all items against the packing list or bill of loading. If there are shortages or evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol within 7 days (maximum) in case of shortages or discrepancies, according to the packing list. This action will help ensure a speedy resolution to any perceived problems. Keep a record of all claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, especially if the wrappings are to be discarded.

2.2 Inspection

Equipment that is found to be damaged or has been modified away from its published specification must not be used. Please contact Ampcontrol if the equipment is suspected to be different than that ordered or if it does not match the published specifications.

2.3 Storage after Delivery

When the equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors, preferably on shelves and protected from the elements.

2.4 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

CAUTION!	**Take care when unpacking crates as the contents may have shifted during transport.**

	The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water. **Ensure that any timber and cardboard used as packaging is disposed of in a safe and environmentally responsible manner.** **Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.**

3 INSTALLATION

3.1 General Warnings

These instructions have been designed to assist users of the Gasguard CH4 Sensor with installation.

Before the sensor can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the sensor or the system into which it is installed.

Along with relevant competence, and an understanding of the target application, the following points should be considered:

3.1.1 Ensure that the information provided in this user manual is fully understood.

It is extremely important that the limitations and functionality of the Gasguard CH4 Sensor are understood to prevent incorrect installation and use from creating a potentially dangerous risk. If in doubt as to the nature of the limitations or their implication, consult a competent authority such as a supervisor or Ampcontrol technical representative.

3.1.2 Ensure that the application into which the sensor is being installed has been properly defined, designed and approved.

Any system intended to mitigate the risk of injury needs to be properly designed and implemented. Such a system must be the result of structured risk analysis with the outcomes used to define the system requirements. These requirements, in turn, will guide the choice of instrumentation, logic solvers and actuators needed to implement the system. Understanding the needs of the system will ensure proper selection of equipment.

3.1.3 Ensure that the sensor will properly perform the required functions within the system design.

It is important to understand how the sensor is intended to interact with other equipment within a system. For safe and reliable use, it is crucial that neither the sensor's logical operation nor its signalling be compromised by incompatibilities with connected equipment.

3.1.4 Modifications of any form to the Gasguard CH4 Sensor are prohibited.

The sensor as supplied has been designed and manufactured to comply with the requirements of protection standards. If modifications of any form are made, the equipment may no longer be fit for use. If any modifications or damage to the sensor is evident, do not use the equipment and contact Ampcontrol for advice.

3.2 Product Safety Markings

The Gasguard methane sensor carries the following information as part of its front panel labelling:

Equipment Type: **Gas Sensor/Transmitter**

Product Type: **Gasguard Series 65-6551CH4**

Cert No: **Baseefa09ATEX0204X**

Ex marking: Ⓔx **I M1 Ex ia I [-20°C ≤ Ta ≤ +40°C]**

These markings provide information identifying the sensor type, certificate number and its safety classification. This information, along with that provided on the certificate must be taken into account when installing, operating and maintaining this sensor.

3.3 Recommendations

- Select a suitable central location for mounting with good access. The location should be as clean and dry as practicable and at a temperature as close to 20°C as practicable.
- Mount the sensor unit in a position that minimises the risk of mechanical damage.
- Mounting should be to a vertical surface, allowing for easy wiring access and subsequent servicing. It is essential that the sensor be positioned to take into account the expected flow of the gas to be measured (see 3.4 Sensor Location).
- The sensor should not be mounted with the gas detection port pointing upwards. Positioning the sensor in this manner could result in the gas entry holes and filter membranes becoming blocked by water or debris. If this occurs, the sensor will likely suffer reduced sensitivity and/or extended response times.
- It is recommended that the sensor is not mounted next to electrical cables or equipment that is likely to produce large amounts of electrical or magnetic switching noise.

3.4 Sensor Location

The relative density or buoyancy of the gas or vapour with respect to air is a very important consideration. This determines its propensity to rise or fall when released into the atmosphere.

Gases or vapours with buoyancy less than air will tend to rise from the source of release. Conversely, gases or vapours heavier than air will tend to fall from the source of release.

Over time, all gases will disperse and become mixed into the general surrounding atmosphere. Methane is lighter than air and can therefore become trapped in elevated areas where low air currents prevent mixing. Places such as corners, roof or cable spaces are examples.

For monitoring in areas where there are no air currents, mount the sensor as high as possible. For areas that are ventilated and have good airflow, positioning is not as critical since general mixing will occur. For these areas it is recommended to locate the sensor around, or just above head height. For applications requiring specific detection characteristics such as at the point of potential release, proper analysis of the site should be undertaken to determine the optimum sensor location.

3.5 Mandatory Installation Practices

Using the Gasguard CH4 Sensor in a manner that exceeds its electrical, functional or physical specifications, or in a way that is contrary to its operating restrictions, may create risks to personnel and/or equipment resulting in injury or death.

- The sensor must be powered from an intrinsically safe source of power. This may be either:-
  - An intrinsically safe power supply
    OR
  - A safe-area located, non-intrinsically safe power supply via the use of an appropriate zener barrier.
- The sensor must not be directly powered from a non-intrinsically safe power supply (i.e. without the use of an intervening appropriate barrier).
- Connections to and from this sensor must only be to equipment with compatible entity parameters.
- The installation of this sensor must be carried out by suitably trained and qualified personnel.

- Certification and identification labels fixed to this sensor must not be damaged, removed or covered before, during or after installation.
- Modifications must not be made to any part of the sensor. As supplied, the unit is built to, and complies with the standards against which it has been certified. Modifications to its construction will render the unit incompatible with its certificate.
- Complete and accurate records of the installation must be kept as part of the site installation dossier.

4 GASGUARD CATALYTIC METHANE SENSOR OVERVIEW

Ampcontrol's Gasguard Flammable Gas Sensor/Transmitter is supplied complete with an amplifier and a Liquid Crystal Display.

The Gas sensor is housed in a cast stainless steel enclosure, has been approved to be intrinsically safe and is suitable for use in a Zone 0 hazardous area. A remote head version with up to ten metres of cable is also available for use on mobile machinery such as roof bolters and continuous miners.

Key Features

- Rugged Construction
- Reliable
- Certified Intrinsically Safe – Ex ia
- LCD Display
- Non-Intrusive Closed Case Calibration

	1.This manual provides commissioning, calibration and maintenance instructions for the Ampcontrol Gasguard Sensor Units. Because the units are passive monitoring devices, operating instructions are not applicable to this equipment. **2.The chemical symbols for toxic-gases and oxygen are used extensively throughout this manual.**

The Gasguard sensor units consist of:

- Catalytic - Methane Sensor (CH4)

For which the following instructions and diagrams are included in this manual:

- Amplifier PCB Description
- Sensor Wiring Diagrams
- Stainless Steel Housing Enclosure Dimensions

Unique part numbers in accordance with the following scheme identifies the sensor unit configurations:

- Item Number 65-6551CH4 is for Catalytic sensor units.

	In the part numbers listed above, CH4 represents the chemical symbol for methane, the gas detected by this sensor.

4.1 Mechanical Arrangement

The dimensions of the sensor unit are shown in Figure 1 below:

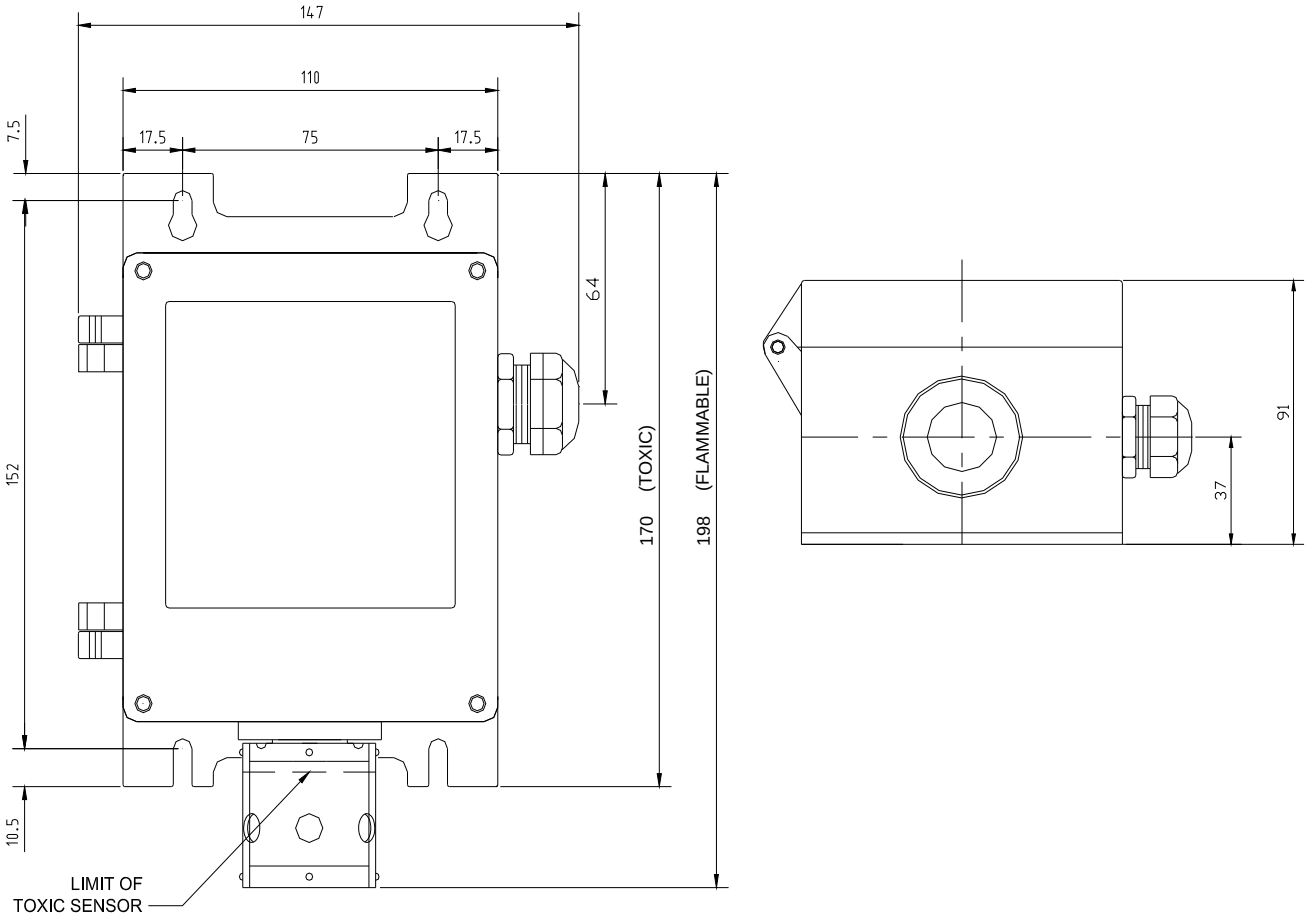

Figure 1: Catalytic Sensor dimensions

4.2 Electrical Connections

Electrical connections to the catalytic sensor are by means of a cable encapsulated into the sensor and terminated with a cable mounted plug. The sensor plugs into the Amplifier electronics PCB (Connector J4). The amplifier PCB is fitted with plug/screw connectors. This allows the connector to be unplugged from the PCB to attach the wiring and then be plugged back into the board.

A second wiring assembly connects the supply and signal connections from the incoming terminals to the Amplifier electronics PCB (Connector J5). Figure 2 shows the electrical connection of the Sensor.

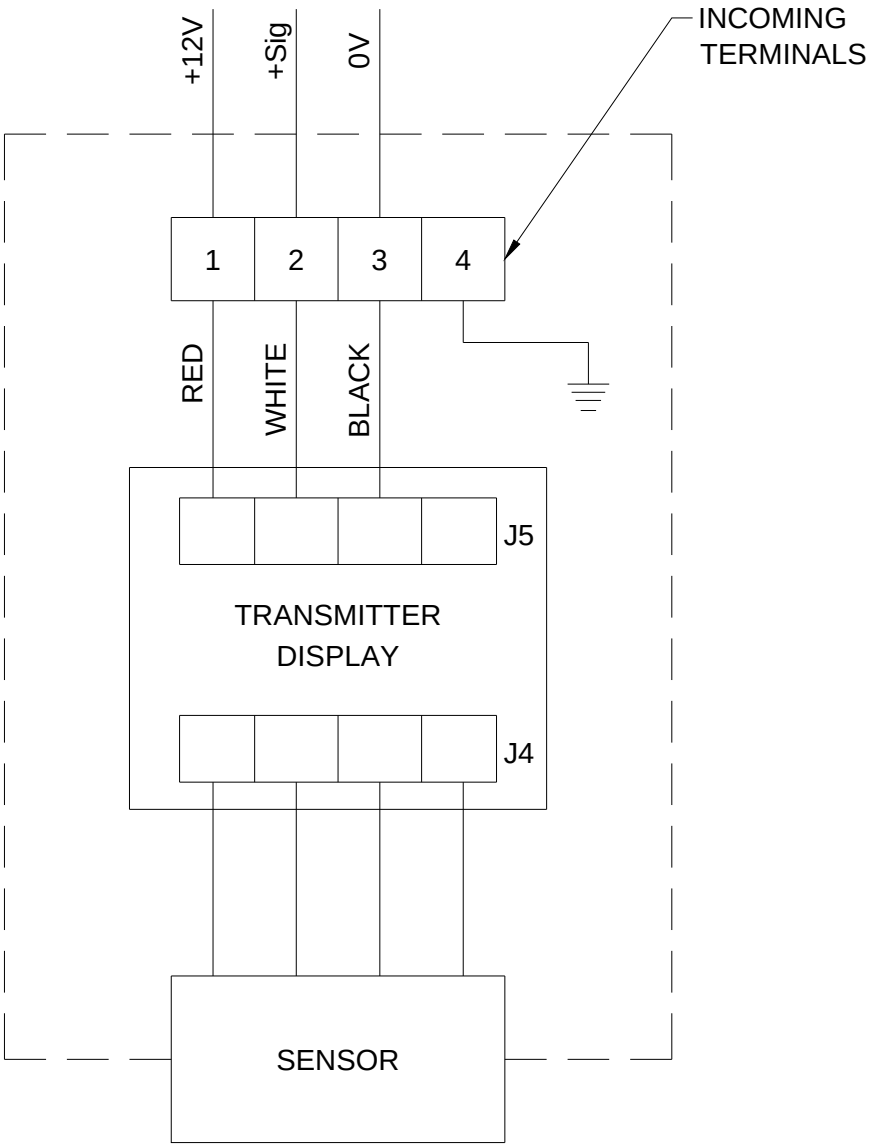

Figure 2: Catalytic Sensor electrical connections

4.3 Sensors Details

4.3.1 Methane Gas Sensor

The Methane Gas Sensor, which operates on the catalytic combustible gas detection principle, is a small platinum element coated in a catalyst. Electrical current is passed through the platinum wire and the potential of the catalytic element is monitored by a simple Wheatstone Bridge arrangement. Combustible gases, once in contact with the heated catalytic surface of the measuring element, react and cause the surface temperature of the element to rise. Any increase in temperature affects the resistance of the platinum wire, causing a small shift in potential across the Wheatstone Bridge proportional to the concentration of the combustible gas. The sensor is temperature compensated and provides a 4/20mA linear output.

4.3.2 Sensor Cell Cross Sensitivity

Methane gas sensors positively detect the presence of all flammable gases. It is unable to distinguish the difference between gases so the sensor will display a reading if any flammable gas is present. The table below details the cross sensitivity data for a methane sensor.

Gas	*Concentration*	*Reading (% v/v)*
Acetic Acid	4.0%	1.45
Acetone	2.6%	2.5
Ammonia	15%	6.25
Benzene	1.2%	2.0
n-Butane	1.8%	2.5
Carbon Monoxide	12.5%	4.0
Chlorobenzene	1.3%	1.7
Ethanol	3.3ppm	2.95
n-Hexane	1.2%	2.0
Hydrogen	4.0%	4.0
Methane	5.0%	5.0
Methanol	6.7%	4.25
n-Pentane	1.4%	2.0
Propane	2.1%	2.5
Toluene	1.2%	2.0

4.3.3 Poisoning of Sensors (Contamination)

High levels of or long exposure to certain compounds may poison the catalytically active detector filament thereby reducing or destroying its sensitivity.

Among these compounds are halides, sulphur compounds, leaded petrol, silanes, silicates and other produces with silicon. Products such as aerosol sprays, polishes, waxes and lubricants with silicones and non-catalysed silicone rubbers such as “silastic”, phosphate esters and hydraulic fluids all damage catalytic sensors.

CAUTION!	**Exposure to Hydrogen Sulphide gas (H2S) may affect the performance of the detector by reducing its sensitivity to methane. If the sensor is exposed to H2S gas then the detector must be recalibrated.**

4.4 Amplifier electronics PCB

The purpose of the amplifier electronics is to convert the low-level electrical output of the sensor into a signal capable of driving external indicator equipment such as the Ampcontrol Gasguard 4 Channel Controller.

The Gasguard amplifier electronics are designed to operate as a 3-wire unit with connections provided for input power, power supply return and current loop signal output.

The electronics require 12VDC operating voltage and transmits a signal in the range of 4 - 20mA.

The 4mA signal level indicates a zero gas concentration. The 20mA signal indicates that the sensor cell has detected a full span gas concentration. **ZERO** and **SPAN** adjustment reed relays located on the PCB are used for calibration of the sensor.

4.5 Enclosures

Stainless Steel Housing

The standard Stainless Steel Housing, Item Number 23-6550LB (shown in Figure 1), incorporates the Sensor Cell and Amplifier PCB. The housing is robust and is corrosion resistant. It is suitable for almost all applications and provides for easy installation and maintenance. When properly used it gives many years of efficient operation.

5 COMMISSIONING AND CALIBRATION

Commissioning is the process of carrying out initial checks, adjustments and calibration prior to placing the system into operation for the first time.

Sensor calibration, although forming part of the commissioning process, is also performed periodically throughout its operational life. Calibration is also required immediately following any repair to the sensor.

During commissioning and subsequent recalibration, it is important to ensure that appropriate steps are taken to prevent the sensor output signal from initiating a fault, warn or alarm condition, or inappropriately driving an equipment control function. Consult the relevant equipment user manuals for specific details on how to isolate alarms and functions.

The sensor, as supplied has been factory calibrated to traceable standards. However, before putting the sensors into operation, it is important to verify this calibration. This is especially important if the instruments are commissioned sometime after delivery.

5.1 Preliminary Checks

Perform the following preliminary checks:

- Verify that electrical connections are correct and that they comply with the appropriate standards.
- Apply power to the sensor.
- Check the voltage applied to the Amplifier electronics is between 12VDC and the maximum permitted under the conditions of certification.
- Verify that the sensor is displaying a gas reading and has not entered a fault condition. The reading may not sit at zero initially since the sensor needs to stabilise from the point of applying power.

5.2 Gasguard Display Panel

The Gasguard display provides a number of indications relating to its operational status. The table below lists these along with their meaning.

Display	***Description***
-777	There is no sensor plugged into the amplifier
-888	Sensor is faulty/expired
-999	Amplifier needs reconfiguration
Er	Error has occurred
CAL	Calibration mode initiated (display blinks when in calibration mode)
SAU	Calibration settings have been saved
PU	Powering Up

5.3 Sensor Calibration

	Calibration can only be carried out once the installation is complete and fault free.

Before the start of calibration, the sensor should be powered up and left to stabilise for at least two hours.

Following the stabilisation period, sensor performance can be checked. If performance is within the limits of error given in the product specification, no calibration is required.

5.3.1 Calibration Gas

Sensor zero calibration must only be carried out using **nitrogen or industrial grade clean air** that is within its expiry date and carries a standards traceable specification.

Sensor span calibration must only be carried out using **methane** that is within its expiry date and carries a standards traceable concentration.

To achieve the required concentration for calibration purposes, methane is mixed or 'balanced' with a 'carrier' gas. This carrier gas must be air for the Gasguard's catalytic sensor to operate correctly. Methane balanced with nitrogen must never be used to verify or calibrate the sensor since this will inhibit the function of the catalytic sensor bead.

Calibration gas should ideally be 50% of full scale. However, sometimes, due to practical restraints and safety reasons, the gas may need to be less than 50%. Concentrations of less than 25% of full scale should not be used in order to avoid potential calibration inaccuracies.

5.3.2 Flow Rate

Calibration gas should be applied to the sensor at a rate of approximately 0.5 to 1.0 litres per minute. It is not necessary to leave the gas flowing to the sensor for any longer than is needed for the output to stabilise and the calibration adjustment to be made.

5.3.3 Safety

Because sensor calibration involves the use of gas, appropriate safety procedures must be observed in regard to its safe handling and use.

Proper regard to site safety practices must be given, including the creation of safe work method statements where necessary. Specific conditions relating to the site into which the sensor is located may also need to be considered. It may be necessary to use equipment that is approved for use within the area where the sensor is located.

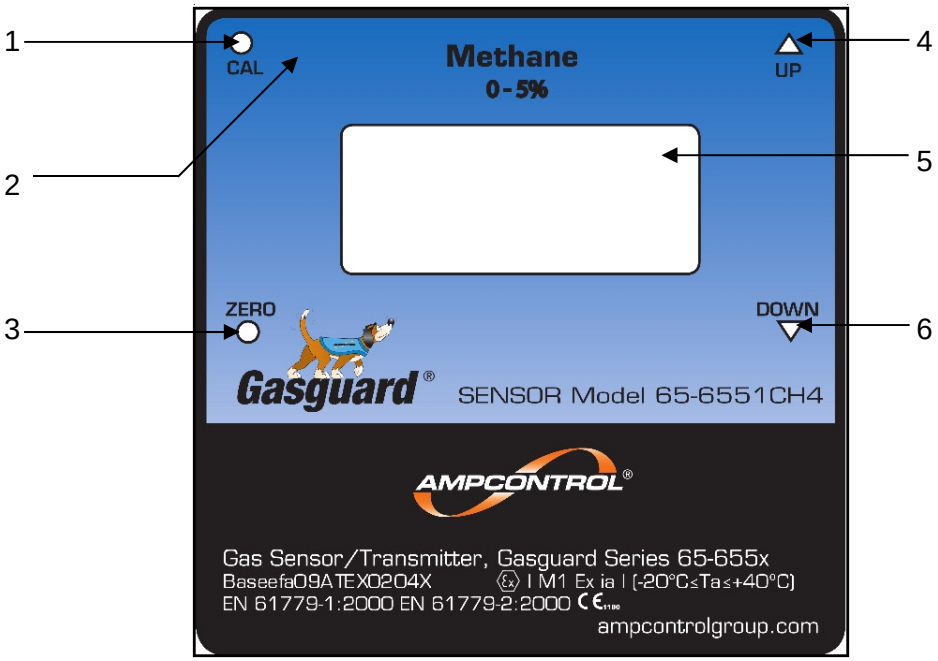

Figure 3: Gasguard Control Panel

5.4 Zero Calibration

Perform a zero calibration as follows, noting that the gas must be flowing for the duration of the operation:

a) Apply nitrogen/clean air to the sensor via the calibration hood and allow the reading to stabilise.
b) Place the magnetic tip of the calibration pen over the CAL symbol (1) for 5 seconds.
c) Now that the CAL mode is accessed place the magnetic tip over the ZERO symbol (3) for 5 seconds.
d) The display should have a zero reading. To save the zero setting place the magnetic tip over the CAL symbol (1) for 5 seconds.
e) The sensor display (5) will show SAV to confirm that it has saved the zero setting.
f) Turn off the gas flow to the sensor.

5.5 Span Calibration

Perform a span calibration as follows, noting that the gas must be flowing for the duration of the operation:

a) Apply methane to the sensor at the rate of 0.5 to1 litre per minute and allow the reading to stabilise.
b) If the reading lies outside the error limits given in the product specification, adjustment will be necessary.
c) To adjust the sensor reading so that it reads the correct value for the applied methane concentration, enter calibration mode by placing the magnetic tip of the Calibration pen over the CAL symbol (1) for 5 seconds.
d) Place the magnetic tip of the pen over the UP symbol (4) to increase the display reading and over the DOWN symbol (6) to decrease the display reading. Use these actions to set the reading to the correct value.
e) To save the calibration value, place the magnetic tip over the CAL symbol (1) for 5 seconds.
f) Turn off the gas flow to the sensor.

6 SERVICE, MAINTENANCE & DISPOSAL

6.1 Equipment Service

The Gasguard CH4 Sensor requires no internal servicing during its normal operating life. A number of external system based checks should however be completed on a regular basis. These 'routine inspections' must be carried out by suitably trained people with knowledge of the sensor and the systems into which it is fitted. Routine inspections may take the form of either visual-only checks, or visual and 'hands-on' checks.

6.1.1 Visual Only Inspections

A basic visual inspection focuses on looking at the installation for signs of physical damage, water or dust ingress and the condition of cables and labels. This level of inspection may also include cleaning display windows that have become obscured by dirt.

Observations would typically be:

- Check that equipment enclosures, cable trays, conduits, etc. are in good order with no physical damage.
- Check that sealed wall boxes are free from water and dust ingress internally. Door seals are in good condition.
- Check that connected cables are free from cuts, abrasions and obvious signs of damage. Cable restraints are in good order and correctly fitted.
- Check that labels on equipment, wall boxes and cables are present and in good condition (especially certification labels).
- Check that no modifications have been carried out to installed equipment.

6.1.2 Hands-On (Detailed) Inspections

A more detailed inspection would include all of the elements of a visual inspection, plus some checks that cover the integrity of connections, fixtures and fittings.

In addition to basic visual observations, more detailed integrity checks would involve:

- Verify that equipment housings, wall boxes and other mechanical fixtures are secured in place. This includes terminal box lids, tightness of cable glands, integrity of wall-box mountings, security of equipment fixing to walls/DIN rails etc.
- Verify all electrical connections are secure with no loose screw terminals or DIN rail terminals not fitted to rails etc.

6.2 Equipment Maintenance

WARNING!	**The Gasguard CH4 Sensor has no user-serviceable parts. All repairs must be carried out by Ampcontrol only. If a fault develops, return the relay to Ampcontrol for repair. It is essential that no attempt be made to repair the unit as any attempt to dismantle or repair the sensor can seriously compromise the safety of the unit.**

6.2.1 Periodic Maintenance

Periodic maintenance involves scheduled checks to ensure the instrument remains operating safely and performs within its specification. The following maintenance schedule is recommended.

Specific site schedules may exist to perform visual, close and detailed inspections of equipment. These will include checks for both basic mechanical integrity and electrical/performance checks. The schedule given below is the manufacturer's recommendations.

6.2.1.1 Daily

Verify operation by visually checking the reading on the respective control unit/monitor. Investigate any abnormal deviations from Zero reading.

Clean any dirt from display window to maintain a clear view of readings. This should be done carefully to avoid scratching the window and rendering the display unreadable.

6.2.1.2 Monthly

a) Check the Zero reading in fresh air or by applying nitrogen/clean air. Readjust as necessary.
b) Check the Span calibration with a known concentration of methane. Readjust as necessary.

6.2.1.3 As Required

Replace the catalytic gas sensor whenever it becomes impossible to adjust to Zero, or when the Span adjustment is insufficient to enable adjustment to the calibration gas value. If this occurs, recalibrate the unit as described in Section 5 Commissioning and Calibration.

6.2.1.4 Following Power Removal

If power has been removed from the unit for a long period of time, a re-commissioning check should be carried out.

6.2.2 Corrective Maintenance

During maintenance and subsequent recalibration, it is important to ensure that appropriate steps are taken to prevent the sensor output signal from initiating a fault, warn or alarm condition, or inappropriately driving an equipment control function. Consult the relevant equipment user manuals for specific details on how to isolate alarms and functions.

There are only two active replaceable units in the sensor system, the Amplifier electronics PCB and the gas sensor. Therefore, fault isolation is limited to the following possible faults and remedies.

6.2.2.1 4-20mA output not functioning

a) Verify all connections are correct and are not damaged or disconnected.
b) Verify that the fault does not lie with connected equipment such as controllers etc.
c) Verify the supply voltage applied to the Amplifier PCB is within specification.
d) Check for loose plug and terminal connections.
e) If the above checks indicate no faults, replace the Amplifier electronics PCB.

6.2.2.2 Sensor cannot be Spanned or Zeroed

a) Check the supply voltage to the sensor is within specification.
b) Check for loose plug and terminal connections.
c) Verify the calibration gas being used is of the correct type and is within its expiry date
d) Verify that the gas entry ports are free from obstruction by water or debris.

e) If the above is correct and the problem persists, replace the sensor
f) If the sensor still cannot be Spanned or Zeroed, replace the Amplifier PCB.

6.2.2.3 Erratic Output

a) Check that voltage and polarity applied to the Amplifier PCB is correct. Also, check that there are no severe voltage swings, indicating an intermittent fault in the field wiring or control unit.
b) Check for loose plug and terminal connections.
c) If the above is correct and the problem persists, replace the sensor.
d) If the output is still erratic, replace the Amplifier PCB.

6.3 Disposal

The electronic equipment discussed in this manual must not be treated as general waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health which could otherwise be caused by incorrect waste handling of this product.

7 SPECIFICATIONS

Operational	
Detection Method	Catalytic bead
Output	4-20mA
Accuracy	+/- 5%
Repeatability	+/- 1% of reading
Zero Drift (30 Day Period)	<2% of full scale
Power Requirement	12VDC at amplifier
Sensor Estimated Life	>2 years in clean air
Warranty	1 year
Storage Temperature	0-20°C

Sensor Unit	
Gas	Methane (CH4)
Maximum Range	5%
Max. Gas Applied	6%
Overall Linearity	<+/- 5% FSS
Maximum Drift	Zero, <+/- 5% FSS per month Sensitivity, <+/- 5% FSS per month
Response Time (T90)	<15 seconds (typical)
Sensing Element Life	>2 years
Temperature Range	-10 to +50°C
Resolution	0.10%
Humidity	0-95%
Storage Temperature	-10 to +70°C

8 EQUIPMENT LIST

Part Number	***Description***
143346	Sensor/Transmitter - Integral Sensor Head
143882	Sensor/Transmitter - 5 Metre Remote Sensor Head
143881	Sensor/Transmitter - 10 Metre Remote Sensor Head
115189	Sensor Only - Integral Sensor Head
115197	Sensor Only - 5 Metre Remote Sensor Head
101713	Sensor Only - 10 Metre Remote Sensor Head
121012	Calibration Sealing Ring
101613	Calibration Magnetic Screwdriver
102284	Calibration Magnetic Pen
106024	Calibration Cup
121647	Vibration Clip
121016	Allen Key

APPENDIX

Certifications

Gasguard

AMPCONTROL®

Certificate Number
Baseefa09ATEX0204X

Issued 13 December 2010
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1 **EC - TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa09ATEX0204X**

4 Equipment or Protective System: **Gas Sensor/Transmitter, Gasguard Series 65-655x**

5 Manufacturer: **Ampcontrol Pty Ltd**

6 Address: **Cameron Park, NSW 2285, Australia**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa, Notified Body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. **09(C)0334**

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0: 2006 EN 60079-11: 2007 EN 50303: 2000 EN 61779-1: 2000 # EN 61779-2: 2000 #
Only applicable to the Gasguard 65-6551-CH4

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ⓔx **I M1 Ex ia I (-20°C ≤ Ta +40°C) EN 61779-1: 2000 EN 61779-2: 2000** Gasguard 65-6551-CH4
Ⓔx **I M1 Ex ia I (-20°C ≤ Ta +40°C)** Gasguard 65-6551-CO2

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa Customer Reference No. **6368**

Project File No. **09/0334**

This certificate is granted subject to the general terms and conditions of Baseefa. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa

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Registered in England No. 4305578. Registered address as above.

13 **Schedule**

14 **Certificate Number Baseefa09ATEX0204X**

15 Description of Equipment or Protective System

The Gas Sensor/Transmitter Gasguard 65-655x series use a common transmitter section with alternate sensors to suit the gas being sensed. The transmitter uses an external d. c. power supply. A serial communication port, an RS 485 port and a programming port, available internally within in the apparatus, are only to be used by the manufacturer in a safe area. The sensor reading is displayed on an LCD display panel.

The Gasguard 65-6552-CO2 has an infrared CO_2 sensor head. The sensor head can either be fixed on the transmitter or remotely connected by a specified cable.

The Gasguard 65-6551-CH4 has a catalytic sensor head. The sensor head can either be fixed on the transmitter or remotely connected by a specified cable.

Gasguard 65-6551-CH4 and 65-6552-CO2 terminal parameters:

Power & Signal Terminals J5		Sensor Terminals J4	
U_i	= 16.5 Vdc	U_o	= 16.5 Vdc
C_i	= 40 nF	I_o	= 0.8 A
L_i	= 0	P_o	= 2.171 W
		C_o	= 300 nF
		L_o	= 100 µH

These are suitable for connection to the sensor and its associated cable up to 10 metres in length.

16 Report Number

09(C)0334

17 Special Conditions for Safe Use

1. The accuracy of the equipment when tested according to EN 60079-1 2000 and EN 61779-2: 2000 at -10°C is outside the specified limits of ±2% of the gas concentration. The equipment is however within limits between the temperatures of 0°C and +40°C.
2. This equipment is not intended to be aspirated apparatus.

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

Number	Sheet	Issue	Date	Description
75-6561L-VE1	1 of 1	E1	16/11/2006	GasGuard IR CO2 Optical Bench Interface Board
75-6562L-VE3	1 of 1	E3	16/11/2006	GasGuard IR CO2 Processor Board
75-6563L-VE	1 of 1	E	09/07/2006	GasGuard IR CO2 Sensor Board
75-6564L-VE	1 of 1	E	15/06/2006	GasGuard IR CO2 Lamp Board
75-6565L-VE2	1 of 1	E2	13/09/2006	GasGuard IR CO2 Isolation Board
24-6561L-VE	1 to 4	E	13/04/2006	GasGuard IR CO2 Optical Bench Interface Board
24-6562L-VE2	1 to 4	E2	13/04/2006	GasGuard IR CO2 Processor Board
24-6563L-VE	1 to 3	E	13/04/2006	GasGuard IR CO2 Sensor Board
24-6564L-VE	1 to 3	E	13/04/2006	GasGuard IR CO2 Lamp Board
24-6565L-VE1	1 to 3	E1	15/06/2006	GasGuard IR CO2 Isolation Board
25-0020L-01	1 of 1	0	11/01/2006	Retaining Ring H.D I.R Sensor Manufacturing Details
25-0021L-01	1 of 1	2	27/07/2006	Sinter, Cupro Nickel H.D. I.R Sensor Manufacturing Details
25-0022L-01	1 of 1	1	06/02/2006	Housing Body H.D I.R Sensor Manufacturing Details
25-0023L-01	1 of 1	1	06/02/2006	Housing Top H.D I.R Sensor Manufacturing Details
35-5501L	1 of 1	2	12/09/2006	Mounting Plate H.D I.R Sensor Manufacturing Details
35-5502L	1 of 1	1	12/09/2006	Mount Detector H.D I.R Sensor Manufacturing Details
35-5503L	1 of 1	1	12/09/2006	Mount Light Source H.D. I.R Sensor Manufacturing Details
35-5504L	1 of 1	0	23/02/2006	Lamp, Detr Block & Mounting Plate Heavy Duty Infrared Sensor Assembly Details
61-6552CO2-01	1 of 1	2	12/09/2006	Sensor CO2 Gasguard Infrared General Assembly
61-6552CO2-02	1 of 1	2	12/09/2006	Lamp Block Heavy Duty Infrared Sensor General Assembly
61-6552CO2-03	1 of 1	1	16/05/2006	Detector Block Heavy Duty Infrared Sensor General Assembly
61-6552CO2-04	1 of 1	2	12/09/2006	Reflector & Lamp / Detr Block CO2 Heavy Duty Infra Red Sensor General Arrangement
65-6552CO2-01	1 of 1	2	11/09/2006	CO2 H.D I.R Transmitter With Display In Stainless Steel Enclosure Layout & Wiring
65-6552CO2-02	1 of 1	0	15/09/2006	Detector CO2 Remote In Stainless Steel Enclosure Layout & Wiring
65-6552CO2-R-01	1 of 1	0	15/09/2006	Detector CO2 Remote With Cable Box / Connector General Arrangement
29-6554CO2-01 *	1 of 1	0	14/09/2006	Label CO2 in S/Steel Enclosure Manufacturing Details
29-6555CO2-01 *	1 of 1	0	14/09/2006	Label CO2 2% in S/Steel Enclosure Manufacturing Details
75-6551L	1 of 4	V4H	2004/05/12	Sensor CPU Catalytic (*Schematic*)

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Number	Sheet	Issue	Date	Description
75-6551L	2 to 4 of 4	V4i	2008/04/30	Sensor CPU Catalytic (*Schematic*)
24-6551L	1 of 5	V4	2006/11/15	Sensor CPU Catalytic (Top Overlay)
24-6551L	2 of 5	V4	2006/11/15	Sensor CPU Catalytic (Bottom Overlay)
24-6551L	3 of 5	V4	2006/11/15	Sensor CPU Catalytic (Top Layer)
24-6551L	4 of 5	V4	2006/11/15	Sensor CPU Catalytic (Bottom Layer)
24-6551L	5 of 5	V4	2006/11/15	Sensor CPU Catalytic (Drill Drawing)
75-6556L	1 of 2	4	2004/05/13	GasGuard SM PSU (*Schematic*)
75-6556L	2 of 2	6	2008/04/30	GasGuard SM PSU (*Schematic*)
24-6556L-V4	1 of 4	4	2004/05/05	GasGuard SM PSU (PCB Top Overlay)
24-6556L-V4	2 of 4	4	2004/05/05	GasGuard SM PSU (PCB Top Layer)
24-6556L-V4	3 of 4	4	2004/05/05	GasGuard SM PSU (PCB Bottom Layer)
24-6556L-V4	4 of 4	4	2004/05/05	GasGuard SM PSU (PCB Drill Drawing)
23-5503L-01	1 of 1	5	2007/01/31	Fuse, Intrinsically Safe General Arrangement
65-6551CH4-02	1 of 1	11	2007/03/01	Catalytic Detector CH4 In Stainless Steel Enclosure Layout & Wiring
61-0203GG-01	1 of 1	3	2004/04/28	Remote Head Catalytic Nemoto Detector Heavy Duty Enclosure General Assembly
23-6550LB-01	1 of 1	5	2005/10/13	Stainless Steel Box Gasguard Sensor Enclosure Manufacturing Details
23-6550LL-01	1 of 1	7	2003/09/16	Stainless Steel Box Lid Various Sensor Enclosure Manufacturing Details
110020-01-00-MD-01 *	1 of 1	1	2008/04/30	Label CH4 in S/Steel Enclosure Manufacturing Details
110924-00-00-MD-01	1 of 1	0	2008/04/17	Support, Membrane H.D I.R Sensor Manufacturing Details
110015-00-01-GA-01	1 of 1	0	2008/04/16	Sensor Gasguard Infrared General Assembly
142025-00-00-MD-01	1 of 1	0	5.11.10	Overlay Gasguard CO2 IR Sensor 5% ATEX Manufacturing Details
142026-00-00-MD-01	1 of 1	0	5.11.10	Overlay Gasguard CO2 IR Sensor 2% ATEX Manufacturing Details
142027-00-00-MD-01	1 of 1	0	5.11.10	Overlay Gasguard CH4 CAT Sensor 5% ATEX Manufacturing Details
143426-00-00-MD-01	1 of 1	0	5.11.10	Label Gasguard CO2 IR Sensor 5% ATEX Manufacturing Details
143427-00-00-MD-01	1 of 1	0	5.11.10	Label Gasguard CO2 IR Sensor 2% ATEX Manufacturing Details
143343-00-00-MD-01	1 of 1	0	5.11.10	Label Gasguard CH4 CAT Sensor 5% ATEX Manufacturing Details

* Not required for ATEX certification.